ASTRONOMY MAJOR

Program Director: Melissa Hayes-Gehrke, Ph.D.

The Astronomy Department offers courses leading to a Bachelor of Science in Astronomy as well as a series of courses of general interest to non-majors. Astronomy majors are given a strong undergraduate preparation in Astronomy, Mathematics, and Physics. The degree program is designed to prepare students for positions in government and industry laboratories or for graduate work in Astronomy or related fields. Courses offered by this department may be found under the following acronym: ASTR.

Program Objectives

The Department of Astronomy B.S. program educates majors toward achieving an understanding of modern astronomical concepts, applying physics and mathematics to astrophysical situations, and gaining experience in gathering and reducing data using astronomical instrumentation and computational tools. Completion of this program provides the opportunity for majors to acquire the knowledge and skills necessary for graduate school or employment after graduation.

Program Learning Outcomes

1. Identify basic concepts from the many areas of astronomy, including motions in the sky, gravity, electromagnetic radiation, solar system, stars, and galaxies.
2. Develop mathematical skills, acquire physics knowledge, and practice applying these skills and knowledge in astrophysical situations.
3. Use astronomical telescopes/instruments and reduce astronomical data using modern computational methods.
4. Demonstrate advanced level knowledge in several different areas of astronomy.

For further details, see the department’s assessment plan: http://www.astro.umd.edu/academics/astronomyBS.pdf

Requirements

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ASTR120</td>
<td>Introductory Astrophysics - Solar System</td>
<td>3</td>
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<tr>
<td>ASTR121</td>
<td>Introductory Astrophysics II - Stars and Beyond</td>
<td>4</td>
</tr>
<tr>
<td>ASTR310</td>
<td>Observational Astronomy</td>
<td>4</td>
</tr>
<tr>
<td>ASTR320</td>
<td>Theoretical Astrophysics</td>
<td>3</td>
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Advanced Astronomy Courses

Select any two 400 level Astronomy courses of the following: 6

- ASTR406 Stellar Structure and Evolution
- ASTR410 Radio Astronomy
- ASTR415 Computational Astrophysics
- ASTR421 Galaxies
- ASTR422 Cosmology
- ASTR430 The Solar System
- ASTR435 Astrophysics of Exoplanets
- ASTR450 Orbital Dynamics
- ASTR480 High Energy Astrophysics

Optional Astronomy Seminars:

- ASTR288 Special Projects in Astronomy (ASTR288C-Astronomy Research Techniques)
- ASTR288 Special Projects in Astronomy (ASTR288M-Current Events in Astronomy Research)
- ASTR288 Special Projects in Astronomy (ASTR288I Introduction to the Astronomy Major)
- ASTR288 Special Projects in Astronomy (ASTR288P-Introduction to Astronomical Programming)

Required Introductory Physics Courses 1

- PHYS165 Introduction to Programming in the Physical Sciences 2 3
- PHYS171 Introductory Physics: Mechanics and Relativity 3
- PHYS174 Physics Laboratory Introduction 1
- PHYS272 Introductory Physics: Fields 3
- PHYS273 Introductory Physics: Waves 3
- PHYS275 Experimental Physics I: Mechanics and Heat 2
- PHYS276 Experimental Physics II: Electricity and Magnetism 2

Advanced Physics Courses

- PHYS371 Modern Physics 3
- PHYS373 Mathematical Methods for Physics II 3
- PHYS401 Quantum Physics I 4
- PHYS404 Introduction to Statistical Thermodynamics 3

Supporting Mathematics/Mathematical Methods Courses

- MATH140 Calculus I 4
- MATH141 Calculus II 4
- MATH241 Calculus III 4
- PHYS274 Mathematical Methods for Physics I 3

Total Credits 65

1 Also accepted with consent of advisor: PHYS161, PHYS165, PHYS260, PHYS261, PHYS270, PHYS271 (14 credits)
2 For students with experience with computer programming this course can be replaced by PHYS474 Computational Physics or ASTR415 Computational Astrophysics. If students complete ASTR415 for this requirement, it cannot be counted as an advanced astronomy course (400-level course) requirement.
3 Completion of both MATH246 and either MATH240 or MATH461 will be accepted in place of PHYS274.

Grades in all of the above required courses must be “C-” or better.

Four Year Plan

Click here (https://cmns.umd.edu/undergraduate/advising-academic-planning/academic-planning/four-year-plans/four-year-plans-gened/) for roadmaps for four-year plans in the College of Computer, Mathematical, and Natural Sciences.

Additional information on developing a four-year academic plan can be found on the following pages:

- 4yearplans.umd.edu (http://4yearplans.umd.edu/)
- the Student Academic Success-Degree Completion Policy (https://academiccatalog.umd.edu/undergraduate/registration-academic-requirements-regulations/academic-advising/) section of this catalog